MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during August, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i.

The number of "cyclonic areas" traced on chart i for August, 1885, is seven, the average number for August during the last twelve years being 10.2. That traced as number vi was a tropical hurricane, and caused great damage on the south Atlantic coast. It was most destructive in the vicinity of Charleston, South Carolina, where the damage is estimated at more than $1,500,000.

The most severe and destructive local storms of the month were those which occurred in the middle Atlantic states and New England on the 2d and 3d, during the prevalence of "cyclonic area" charted as number i.

The mean temperature for the month was decidedly below the normal throughout the northern part of the country to the eastward of Idaho; in the south Atlantic and Gulf states it was nearly normal; over the southwestern districts and portions of the plateau and Pacific coast regions it was above the normal.

The precipitation was unusually heavy over the country from Kansas and Nebraska eastward to New England, and on the coasts of South Carolina and Georgia. It was below the average in the extreme northwest; from southern Missouri and Arkansas eastward to the Atlantic coast, and from the east Gulf states westward to the Pacific coast.

Referring to the ice-region of the north Atlantic, reports show that icebergs have drifted farther to the eastward than in the preceding month, while the southern limit is about 1° to the northward of that for July. The small number of icebergs observed, however, indicates that they are rapidly disappearing from the route of trans-Atlantic steamers.

In the preparation of this REVIEW the following data, received up to September 20, 1885, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and sixteen Canadian stations, as telegraphed to this office; one hundred and sixty-eight monthly journals and one hundred and sixty-three monthly means from the former, and sixteen monthly means from the latter; two hundred and eighty-three monthly registers from voluntary observers; reports from 1,430 special tornado observers; forty-five monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Dakota, Indiana, Iowa, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for August, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The mean pressure for the month is least over the central and southern Rocky Mountain districts; it is greatest in the north Pacific coast region and in the districts bordering on the Atlantic and Gulf coasts. The barometric means range from 29.78 to 29.85 in the districts embraced in the area of least pressure, and the highest monthly mean readings, 30.02, are reported from stations in Washington Territory. East of the Mississippi River the mean pressure in all districts ranges from 29.95 to 30.0, except in Minnesota, Wisconsin, and the upper Michigan peninsula, where they are slightly below 29.95.

Compared with the mean pressure for the preceding month, there has been an increase in the northern portions of the country from Idaho eastward to the Atlantic coast, while to the south of latitude 37° N. there has been a decrease in all districts. The increase is most marked from the upper lake region to Montana, where it ranges from .05 to .15. In the districts where a decrease is shown the deficiency ranges from .01 to .05, except along the Gulf coast and in the middle Pacific coast region, where it is somewhat greater.

The departures from the normal pressure at various Signal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are exhibited by lines connecting stations of equal departure. A normal line, on the chart named, is traced from the northern boundary of Minnesota southwestward to El Paso, Texas, and thence eastward to Key West, Florida, the departure at the latter station being +.02. To the northward and eastward of this line the departures are below the normal; to the westward they are slightly above the normal, except on the Pacific coast, where a slight deficiency is shown. The greatest deficiencies (from .05 to .08) occur in the lake region, southern New England, middle Atlantic states, and in portions of the Ohio, Mississippi and Arkansas Valleys. The departures above the normal exceed .05 at but two stations, viz., Santa Fé, New Mexico, +.07, and Winnemucca, Nevada, +.06.

MONTHLY BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. Except at Charleston, South Carolina, the monthly ranges were greatest in the lake region, where they varied from .68 to .88; they were least in Arizona, the lower Rio Grande Valley and in southern Florida, the smallest being as follows: Fort Grant, Arizona, .13; Fort Apache, Arizona, and Brownsville, Texas, .18; Key West, Florida, .20. The unusually large monthly range (1.44) of pressure at Charleston is due to the hurricane which prevailed there on the 25th, when the barometer fell to 28.73.

ANTI-CYCLONIC AREAS.

There were seven of these areas during August, but none were very remarkable, except number vii, which is more particularly described in connection with cyclonic area number vi. It may be remarked, generally, that the frosts which occurred during the month were nearly twenty-four hours in advance of the crest of the barometric wave, which was denoted by the greatest height above the normal, although they also occurred at the same time with the highest abnormal pressure. One of these areas was a continuation of number ix from the preceding month, and all the others came in from the British Northwest Territory and Manitoba.

I.—This area was a continuation of area number ix in July. On the morning of the 1st it covered Manitoba and the British Northwest Territory, and the barometer was from .10 to .16 above the normal. By the morning of the 2d it was over the provinces of Ontario and Quebec and caused light local rains in its progress in New England, the middle Atlantic states, and in the lower lake region. The fall of temperature accompanying this area was nowhere greater than ten degrees. On the morning of the 3d this area was over the Gulf of Saint Lawrence, with the barometer .20 above the normal.

II.—This area followed the great storm of the 1st and 4th, appearing in Minnesota and Dakota on the morning of the latter date; the gradient was quite steep, and high winds prevailed in the lake regions on the 4th. By the morning of the 5th this area had moved eastward and had covered the upper lake region, with a rise here of from .30 to .50 in the twenty-four hours. Rains preceded this area, but there was no decided fall of temperature. By the morning of the 7th this area had moved easterly over New England. By the morning of the 9th it had commenced to move off the coast of the Canadian Maritime Provinces. This area was followed in its progress on the 6th and 7th by almost general rains in the upper Mississippi and Ohio valleys and in the lake regions. On the 5th there were some fresh winds on the New Jersey coast, due to the anti-cyclonic influence.

III.—This area appeared in the British Northwest Territory on the morning of the 7th; it seems to have moved from the high area that had prevailed for a few days in the north Pacific coast region. It moved in a southeasterly direction until the afternoon of the 10th, when it was central over Lake Michigan. From this time it gradually spread eastward and covered the Atlantic coast states on the 12th. Generally fair weather, with slightly lower temperature, accompanied this area in its progress.

IV.—This area made its appearance on the morning of the 10th, coming, like its predecessor, from the Northwest Territory. On the morning of the 11th it was central in Montana, where it remained without any decided change until the afternoon of the 12th. By midnight of the 13th it embraced the upper lake region and the upper Mississippi and Missouri valleys, and caused brisk winds on the upper lakes on this date. Although this area was not accompanied by any very decided fall in temperature, light frosts were reported in the public press as having occurred on the morning of the 14th in Michigan, Wisconsin, and Minnesota, and in New England, New York, and Pennsylvania on the morning of the 15th; the minimum temperatures reported were from 45° to 55° at most stations in these states during this time. The "New York Tribune" of the 19th spoke of the frost warning that was given on the 13th for Michigan and Wisconsin as particularly valuable, as were the subsequent warnings for New England and New York. By the morning of the 17th this area began to move eastward off the Atlantic coast.

V.—This area appeared in British Columbia on the morning of the 17th; by the morning of the 19th it had moved easterly and was central in the Missouri Valley; by the 20th it had embraced the Atlantic coast states, and moved off the coast on the 21st. It caused high winds on the New Jersey coast on the 19th, but otherwise was not at all remarkable.

VI.—This area also came from the British Northwest Territory and appeared on the morning of the 20th over Montana; it followed closely cyclonic area number v, with crowding isobars, which were a little more open by the morning of the 21st. In the eastward movement of this area it followed the above cyclonic storm, and by the morning of the 23d commenced moving off the Atlantic coast. The general rise of the barometer in the progress of this area was not very great nor rapid, although it assisted in producing the high winds recorded upon the lakes. The fall of temperature was also slight as it moved eastward. The rains in advance of this area were generally local, but not very heavy.

VII.—This area appeared in Manitoba on the morning of the 23d, and gradually extended and increased until the morning of the 28th, when it moved off the coast. This anti-cyclone must be closely studied in connection with cyclonic area number vi.

VIII.—This area appeared in Manitoba on the morning of the 30th and spread gradually southeastward, covering nearly the whole of the country by the midnight report of the 31st. It carried with it generally fair weather, but no decided fall of temperature. It will be further described in the REVIEW for the month of September.

CYCLONIC AREAS.

There were seven cyclonic storms during the month of August, of which six were quite within the limits of the Signal Service stations; one, number iv, passed so far north through Canada that the track of its centre is somewhat doubtful. One, number vi, was the West India cyclone of the 24–26th, and is remarkable for the great force of the wind, and the destruction of life and property, particularly at Charleston, South Carolina. Area number i traversed the country in a northeasterly direction from Arkansas, and was very severe on the northern lakes.

The following table gives the latitude and longitude in which the centre of each area was first and last located, and the average hourly velocity:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	36 00	92 30	52 00	64 30	19.0
II	43 00	102 00	51 30	63 00	27.7
III	45 00	99 00	50 00	62 00	21.0
IV	51 00	103 00	53 00	65 30	24.5
V	49 45	101 30	50 30	60 30	30.0
VI	26 00	79 00	35 15	77 00	*13.8
VII	29 30	89 00	33 30	78 30	18.0
Mean hourly velocity					22.0

*Average velocity from 7 a. m. of 24th to 11 p. m. of 25th.

I.—This area developed in Arkansas on the afternoon of the 1st, with a small, well-defined but not violent storm, whose centre was a little northwest of Little Rock. The morning map of the 1st presented no great contrasts of pressure or temperature. The line of normal pressure ran from near Marquette, Michigan, in a southwesterly direction to Santa Fé, New Mexico; to the east and south of this line the pressure was from .10 to .17 below the normal, while north and west of the line the pressure was slightly above the normal. On the afternoon of the 1st thunder-storms occurred in New England, the middle and south Atlantic states, the lower lake region, the Ohio Valley and Tennessee, and in Arkansas, but there was nothing to indicate any extensive cyclonic storm. By the morning of the 2d the centre had moved northeasterly and was near Springfield, Illinois, with an abnormal fall of the barometer of .22 in the twenty-four hours; light local rains had fallen in all districts where the barometer was below the normal, as stated above. By the afternoon of the 2d the influence of the storm was felt on Lakes Erie and Michigan, and fresh northeasterly winds occurred; at this time the centre was north of Indianapolis, Indiana; the rain-area had increased in extent and it was easy to define the course of the storm. By the

morning of the 3d the pressure over the lake regions, Ohio Valley, and middle Atlantic states was from .30 to .40 below the normal; and, besides a general rainfall, high southeasterly winds prevailed on the New Jersey coast. On the afternoon of the 3d occurred the violent storm in the vicinity of Philadelphia, Pennsylvania, and Camden, New Jersey, which occasioned loss of life and great destruction of property. Six persons were killed and one hundred wounded, and the destruction to property was estimated at half a million of dollars. The winds on the New Jersey coast were from twenty-five to fifty miles an hour. By the afternoon of the 4th the centre of the storm was north-northwest of Montreal, Canada, and at this time high westerly winds were reported on the lower lakes. By the afternoon of the 5th the centre was northwest of Anticosti. During the progress of this storm across the country thunder-storms occurred in nearly all districts, and the rainfall was unusually great. The midnight map of the 5th showed that the storm had passed off the coast of Labrador.

II.—This area appeared on the morning of the 7th with the centre nearly north of North Platte, Nebraska, at which place the barometer was .27 below the normal. By the morning of the 8th the centre was near Omaha, Nebraska, having moved southerly to near West Las Animas, Colorado at the previous midnight, and then northeasterly. On the morning of the 8th the area of lowest barometer was bounded by a long oval stretching from Duluth, Minnesota, to the Pan Handle of Texas. A very heavy rain fell on this date at Yankton, Dakota, and numerous thunder showers in the upper Mississippi and Missouri valleys. By the morning of the 9th the storm was central near Marquette, Michigan, and high winds prevailed during this day on the upper lakes. From this date the centre moved northeasterly until midnight of the 10th, when it was well north of the Gulf of Saint Lawrence. Thunder showers were frequent during the progress of the storm, occurring generally in the quadrant southeast of the centre.

III.—This area appeared on the morning of the 11th, and was central near Huron, Dakota. It moved east-northeast until the morning of the 15th, when it was central over Newfoundland. This storm was characterized by light local rains in its progress, and light winds. On the afternoon of the 12th, when the centre was a little northeast of Marquette, Michigan, there occurred in northern New York a tornado of marked violence, which raged with great fury at Norwood, New York, where several persons were killed, others were injured, buildings blown down, and where there was a heavy fall of rain accompanied by hail. This severe local storm was not indicated by any unusual action of barometer or thermometer. The morning reports in the immediate vicinity showed a slight rise of temperature and a very slight abnormal fall of barometer, so that it was practically unforeseen.

IV.—This area appeared in Manitoba on the morning of the 14th and pursued an easterly course until it passed into Labrador at midnight of the 18th. It was a storm of very slight energy, and its influence was but little felt even in the lake regions; there were some fresh winds on Lake Superior on the 16th, but no damage was reported.

V.—This area also appeared first in Manitoba on the morning of the 19th, but it was not well developed until the midnight of the 20th, when its centre had moved southeasterly and was located near Saint Paul, Minnesota; from here it moved northeasterly and passed to the Labrador coast by midnight of the 22d. On the 21st, during the passage of this storm, high winds prevailed on the Lakes, and heavy rains and thunder-storms were frequent; the rain-area extended to the Ohio Valley and the northern part of the middle Atlantic states. In Chicago, Illinois, on the 21st, lightning struck the building of Oberne, Horick & Co., and destroyed building and stock to the amount of $65,000. The thunder-storm here was very heavy. In other lake cities damage was done by lightning and by the high winds. In Buffalo, New York, where the wind reached a maximum velocity of forty-two miles, the "Western Transit Company's shed was blown down; chimneys, trees, signs, fences, and out-houses, also, throughout the city were injured." The "storm signal flying gave great satisfaction." The order to hoist the signal was received at 10.55 a. m. on the 20th, so that there was an ample warning of nearly twenty-four hours. This storm was described as "the most severe and destructive thunder-storm of the season;" this same remark was made in the abstract of journal of the observer at Rochester, New York.

VI.—This storm was the West India cyclone that visited the south Atlantic coast on the 24th and 25th, and deserves special and particular mention. The morning map of the 23d showed an area of high barometer on the Carolina coast and in Georgia, the barometer being lowest in Colorado, with indications of the formation of a cyclonic storm in the Missouri Valley; an abnormal fall of the barometer of .10 occurred in the upper Mississippi valley, and heavy rains had occurred during the night at Chicago, Illinois, Davenport and Des Moines, Iowa. At Jacksonville and Key West, Florida, light northeast winds had been reported for twenty-four hours. By midnight of the 23d a high area had appeared in Manitoba, with the barometer .10 above the normal, and the cyclonic area extended in a long oval from Colorado to New England, with the barometer from .10 to .20 below the normal. The rain-area was nearly coincident with this low area. The wind was northeast at Jacksonville, Florida, with a fall of .05 in the barometer, and north wind at Key West, Florida, with a rise of .02 in the eight hours. These conditions show how unexpected was the great fall of barometer at Jacksonville, Florida, reported on the morning of the 24th, when an abnormal fall of .15 was reported, with light rain and a fresh wind of sixteen miles. The wind at Key West, Florida, was light northerly, and at Savannah, Georgia, light northeasterly. The long trough continued from Colorado to Nova Scotia, with a high area in the east Gulf states, and the highest barometer in Manitoba. The rain-area continued along the axis of this trough. Fearing that a disturbance might be coming in upon the coast, the Indications Officer called for special midday reports from several of the stations on the south Atlantic coast, upon the receipt of which reports cautionary storm signals were ordered, and notice of the storm was telegraphed to the New York Maritime Exchange. Before the receipt of the order for the cautionary signal at Jacksonville, Florida, the storm itself had already reached there, and the afternoon chart plainly showed the centre of the cyclone to be northeast of this place and south of Savannah, Georgia; at the latter place a brisk northeast wind of nineteen miles, and at the former a gale of forty miles from the west. Perhaps the afternoon charts of the 24th presented some of the most remarkable features ever witnessed, which were about as follows: A West India cyclone was raging on the Georgia coast, with the barometer .30 below the normal, winds increasing in force, and light rains. A long, narrow trough, in which the barometer was .20 to .30 below the normal, extended from northwestern Texas to the Gulf of Saint Lawrence; within this trough were several small depressions bounded by the isobar for 29.70; the barometer was lowest over the Gulf of Saint Lawrence, with the isobar for 29.50 bounding the storm centre; heavy rains and severe thunderstorms marked this trough. The barometer was highest and still rising in Dakota and Manitoba. The temperature was slightly below the normal on the Georgia and South Carolina coast, and was from 5° to 12° above the normal in the southern part of New England, in the middle Atlantic and east Gulf states, the Ohio Valley and Tennessee, and in North Carolina, then again to the north of this region the temperature was from 10° to 20° below the normal.

The midnight map of the 24th showed that the centre of the cyclone had moved slightly northward and was near Savannah, Georgia; 7 a. m. of the 25th it was near Charleston, South Carolina; the afternoon of the 25th it was north of Charleston, South Carolina, and west of Smithville, North Carolina; at midnight it was north-northwest of Wilmington, North Carolina, and west of Hatteras, North Carolina; and by 7 a. m. of

the 26th it had passed off the North Carolina coast near Kitty Hawk, North Carolina. By midnight of the 25th the trough spoken of above had been rapidly filled up, the high area number vi having moved gradually southeastward until the cyclone was forced off the coast, and there was a great rush of cold air from the Northwest over the middle and south Atlantic states. On the morning of the 25th killing frosts were reported in Minnesota and Dakota, and on the morning of the 24th further north. On the 26th snow fell at Haney's Lake and Houtzdale, Pennsylvania. The winds attending the cyclone on the south Atlantic coast were terrible in their force. The Signal Service observers in their journals, and the public press, have fully described them, and also the destruction occasioned by this storm, the influence of which was great even upon the New England and middle Atlantic coasts. The winds over fifty miles per hour are mentioned elsewhere under the heading "High winds;" and winds of over twenty-five miles per hour prevailed at all stations on the coast from Boston, Massachusetts, to the Florida coast.

In closing the description of this cyclone the following extracts are made from the journals of the observers at the following stations:

Jacksonville, Florida, 24th.—"Light rain this a. m. The 7 a. m. reading of the barometer showed that a rapid fall had occurred during the night. * * * The wind increased gradually to a gale at 1 p. m. * * * At 2.25 p. m. up signals received. * * * The wind blew a gale from the west of from 28 to 40 miles from 1 to 6 p. m., after which it gradually moderated."

Savannah, Georgia, 24th.—"Up signals received at 1.30; wind increased in force to 30 miles at midnight; rain fell from 3.20 p. m. to 6.25 p. m.; temperature high and barometer falling slowly. 25th, at 4.30 a. m. wind from nw., 56 miles per hour. The storm was the severest felt here since August 27th, 1881. At Tybee the wind was estimated at 75 miles. There was considerable damage to shipping, and one life was lost, the second officer of the s. s. 'Wm. Lawrence' was drowned."

Charleston, South Carolina, 25th.—"The damage by the storm is estimated at $1,690,000. Twenty-one lives were lost."

Smithville, North Carolina, 25th.—"At 5.15 p. m. the wind had reached the terrific velocity of 98 miles per hour, when the anemometer was blown away; between 5.15 and 5.45 p. m. it is estimated the wind was blowing 125 miles per hour. The cautionary signal raised yesterday undoubtedly saved much property. It is estimated that $100,000 will not cover the entire damage done in the town and county."

Wilmington, North Carolina, 25th.—"Gale from the south in the p. m., accompanied by heavy rain, falling barometer and temperature; maximum velocity of wind, 52 miles."

Hatteras, North Carolina, 24th to 26th.—"Thunder-storm; heavy rain; maximum velocity of wind, 52 miles; up signals received at 7.15 p. m., 24th."

Kitty Hawk, North Carolina, 26th.—"A northerly gale prevailed from 2.30 a. m. until 9.45 a. m.; at 4.10 a. m. a velocity of 50 miles per hour was recorded."

It must be recorded here that the reports and information given by the observers at all the stations on the south Atlantic coast to this office and to the general public were of the most valuable character and of the minutest detail.

On the morning of the 26th the centre was about longitude 70° W. and latitude 35° N., and high winds were reported on the coast of the middle Atlantic states.

In connection with this cyclone, it must be remarked that immense benefit would accrue to the Atlantic and Gulf coast shipping interests, and to the cities upon the coast, if the United States should have four stations in the West Indies and four in Mexico operated and reporting in the same way as those very essential and most valuable stations in the Dominion of Canada. The cost of maintaining or assisting such stations would be slight, indeed, compared to the great loss of property at Charleston, South Carolina, and the value would be shown in one season.

VII.—The approach of this storm was indicated on the morning of the 29th, but the centre could not be definitely placed until the morning of the 30th, when it was a little southeast of New Orleans. By the morning of the 31st the centre had moved northeasterly and was north-northwest of Jacksonville and southwest of Savannah. By midnight the centre had passed off the South Carolina coast. High winds, with heavy rains, prevailed in the south Atlantic and east Gulf states, and the storm would have been thought quite severe if it had not been brought into such close contrast with its predecessor.

NORTH ATLANTIC STORMS DURING AUGUST, 1885.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0-10.]

The paths of the atmospheric depressions that have appeared over the north Atlantic have been determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service," abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data received at this office up to September 22, 1885. The Chief Signal Officer is also indebted to Commander J. R. Bartlett, U. S. N., of the Hydrographic Office, for data used in the preparation of this chart.

The paths of seven atmospheric disturbances are shown on the chart for August, 1885; the more important of these were numbers 3 and 7; the first mentioned being a storm of much energy, which apparently originated within the sub-tropical regions between latitude 25° and 30° N. Number 7 is a continuation of the West Indian hurricane which moved with such disastrous results along the coast of the Carolinas during the last decade of the month. Of the remaining depressions, numbers 2 and 4 displayed considerable storm-energy during their passage; the others, however, were generally of slight intensity.

The following are descriptions of the storms charted:

1.—This was probably a continuation of the depression traced on the chart for the preceding month (July) as number 6. At the close of that month the depression occupied the region near N. 47°, W. 42°, and on August 1st it was shown near N. 52°, W. 38°, the lowest reported barometer being 29.51 (749.5), with moderate s. to sw. gales occurring between W. 30° and 40°. On the 2d the storm-centre was near N. 55° and to the westward of the thirtieth meridian, the pressure remaining unchanged, and by the following day it had passed beyond the field of observation.

2.—This depression appeared between W. 20° and the British coasts on the 8th; the reports indicated the presence of a large, elongated area of low pressure extending from about W. 15° southwestward to the vicinity of the Azores, the barometer within this area ranging from 29.5 (749.3) to 29.75 (755.6), with variable winds, of force 5 to 7. On the 9th the storm-centre became clearly defined in about N. 55°, W. 15°, where the pressure was 29.08 (738.6); during this date moderate to strong southerly gales occurred on the Irish coast and in the Channel, with strong sw. and w. breezes to gales over the northern part of the Bay of Biscay. On the 10th the depression was in the vicinity of the Hebrides, with pressure at the centre less than 29.0 (736.6), and causing moderate to strong ssw. and sw. gales in Ireland, and moderate w. and nw. gales over the ocean between W. 10° and 20°

3.—This disturbance developed, prior to the 8th, over the ocean between N. 30° and 25°, and W. 60° and 65°. At the present writing the earliest report relative thereto is that of the brig "Lilian," H. F. Schive, commanding, as follows: "on the evening of the 7th (in about N. 30°, W. 60°), wind blowing from ene., having shifted from se., with heavy se. and sse. sea, barometer 29.7 (754.4). The wind continued to increase, accompanied by heavy rain, and, at 4 a. m. of the 8th, ship's time, after blowing away the reefed main-staysail, the vessel was run under bare poles, wind hauling gradually to the northward; at

about 8 a. m., ship's time, in about N. 28° 58′, W. 60° 44′, the barometer read 29.2 (741.7), wind blowing a hurricane from n., accompanied by heavy rain; at noon the wind was wnw., and had moderated slightly." The s. s. "Picqua," in N. 28° 19′, W. 54° 25′, on the 7th, had barometer 30.22 (761.1), wind se., force 4, and on the 8th, in N. 28° 0′, W. 58° 4′, barometer 30.14 (765.5), wind s., force 6. Captain Evans, commanding the above-mentioned steamer, remarks, under date of the 7th: "There appears to have been a revolving storm passing to the northward, south of us."

Captain James F. Avery, commanding the bark "Tropic Bird," in about N. 31°, W. 60°, reported, as follows: "The ship had been running west until 8 a. m. of the 8th, with moderate se. wind, gradually increasing to a gale and veering from ese. to e. and back; then hove-to on the port tack under main spencer; wind blowing a heavy gale from ese., and working into ne.; at 12.30 p. m. it was blowing a hurricane, which continued until 3.30 p. m., when it died out to a calm, leaving a heavy swell running. At 4.30 p. m. it began again with wind from wsw., and blowing at a furious rate, until 8 p. m., when it moderated, but the heavy swell continued to run. The hurricane came on without any warning, and was the heaviest that I ever experienced; the barometer did not begin to fall until 8 a. m., and, in four hours, it fell .8 inch, from 30.0 (762.0) to 29.2 (741.7). The vessel lay with her yards in the water, and the topmasts were cut away to right her. After the hurricane passed the barometer rose to 30.0 (762.0) on the morning of the 9th."

Beyond the heavy swell which was observed during the 8th and 9th the passage of this hurricane does not appear to have affected the Bermudas. In this connection, Captain Garvin, commanding the s. s. "Orinoco," reports: "In making Bermuda on the morning of the 9th, we experienced a very heavy swell from se., with stormy appearance in the se.; barometer, 29.97 (761.2). The natives say that the surf on the shores of the island was the heaviest for several years; we had no wind."

The log of the s. s. "Hexham," T. D. Adams, commanding, shows evidence of the existence of the disturbance on the 7th; on the 7th, in N. 34° 47′, W. 54° 45′, that vessel had light winds and fine weather throughout the day, although the sky looked threatening to the southward; a very heavy swell from the southward was also experienced, causing the ship to roll heavily at times; barometer, 29.97 (761.2). The 8th began with fine weather and stationary barometer, but as the day advanced it began to look more threatening in the south, with sea-swell becoming higher; after 8 p. m. the wind freshened from the eastward, with rain, and continued until midnight; barometer, 29.95 (760.7); ship's position at noon, N. 34° 43′, W. 58° 43′.

The bark "Ludwig Heyne" was towed into Bermuda, disabled, on the 15th, having encountered a hurricane in N. 31° 0′, W. 64° 39′, on the 8th.

During the 8th the storm-centre appears to have moved northward, and by the 9th its position may be closely approximated from the reports of the steamers "Hexham" and "Wellfield." Captain Adams, of the "Hexham," reported that after midnight of the 8th the wind suddenly increased in force, veering to the left a little, and continued with increasing force and heavy rain until 4 a. m. of the 9th, when it was about ene., barometer falling rapidly; the ship was then hove-to, the rain and spray making it impossible to see two ship's lengths in any direction, and the mastheads were tipped with the usual "St. Elmo's fires"; frequent and vivid lightning was observed until the wind reached its maximum force, when the lightning ceased. At 6 a. m. the wind was ne., blowing a furious gale. At 8 a. m. it was n., when it lulled considerably for about an hour, the barometer being then at its lowest point, 29.22 (742.2); afterwards the wind gradually hauled to the left and suddenly freshened up from wnw., increasing to a furious gale, which lasted until the afternoon, when it gradually lulled, and at midnight it was almost calm; the barometer rose steadily after 8 a. m. The ship's position at noon of the 9th, by account, was N. 35° 10′, W. 61° 43′.

Captain J. Balley, commanding the s. s. "Wellfield," encountered a hurricane on the 9th; the lowest barometer (corrected), 28.97 (735.8), was observed at noon, in N. 35° 0′, W. 61° 19′; the wind set in from ene., and shifted to ne., n., and nw.

According to newspaper reports the following vessels, viz., barks "Geo. Davis," and "Slieve Bloom," ship "Forest King," and the schooner "Mattie W. Attwood," all between N. 40° and 44°, and W. 53° and 55°, experienced winds of hurricane force in which they sustained damage; in these reports, however, the wind-directions and barometric pressure are not stated.

The storm-centre moved slowly northeastward without any decrease in the force of the gales which accompanied it, and, on the 10th it was near N. 40°, W. 57°, The report of Captain Foote, commanding the s. s. "Greece," is interesting. He states that at the noon observation of the 9th, the weather appeared threatening, the cirro-stratus clouds being particularly noticeable and forming a "mackerel" sky; the wind was then ssw., shifting to sse., with heavy sea-swell from s.; at night a large number of corposants were observed on all the yards. The barometer began to be strongly agitated, rising and falling rapidly, and indicating a decrease of pressure amounting to 1.10 inches (28 m.m.) during the storm that followed. The indexes of the four aneroid barometers moved back and forth like balances, while all the spirit in the sympiesometer was pumped into the larger bulb. The wind gradually increased from midnight of the 9th, and at 6 a. m of the 10th it was blowing a hurricane; soon after 6 a. m. the wind suddenly lulled for ten minutes and then, backing from se. to nw., it blew from that quarter with increased violence. The barometer reached its minimum, 29.11 (739.4) (not reduced to freezing), at 6 a. m. on the 10th, in N 40° 53′, W. 56° 29′. The gale was of six hours duration.

The bark "Kings County," James Saunders, commanding, at 4 a. m. of the 10th had a fresh s. breeze and overcast sky; at 8 a. m., strong gale with heavy swell from sw.; at noon, terrific squalls of hurricane force, continuing until 8 p. m., when it decreased to a strong breeze. The barometer (corrected) fell from 29.8 (756.9), at 4 a. m., to 28.80 (731.5), at 8 a. m., in N. 42° 09′, W. 56° 00′. At noon the barometer had risen again to 29.8 (756.9), the gale increasing as the barometer rose; at 11 a. m. the wind was nw., and at 1 p. m. it was n., where it remained during the day. The s. s. "Polynesia," A. Kuhn, commanding, encountered a hurricane at 7 a. m. of the 10th, and ending at 8 p. m., the lowest barometer, 29.18 (741.2), was observed at 12.30 p. m., in N. 42° 14′, W. 53° 35′; the wind set in from sse., veering to s. sw., w. and wnw.; severe thunder and lightning, with heavy rain, continued during the disturbance. The s. s. "Elysia," James Brown, commanding, in N. 44° 7′, W. 53° 45′, had a fresh to strong gale, with lowest barometer, 29.02 (737.1), at 2 p. m. of the 10th; the gale set in from e. at 6 a. m., and continued from that point, with heavy rain, until 2 p. m., when it fell light, and suddenly shifted to nnw., through ne.; at 4 p. m. the barometer began to rise and the weather moderated. The s. s. "City of Chester," Henry Condron, commanding, in N. 45° 35′, W. 51° 0′, had barometer 29.3 (744.2), at 5 p. m. on the 10th, the wind shifting from se. to ne., and blowing with the force of a whole gale. The bark "Exile," George J. Pearce, commanding, also encountered this storm in N. 44° 05′, W. 49° 40′; at 3 p. m. the gale commenced from ssw., barometer 29.62 (752.3), and at 6 p. m. it was blowing in terrific gusts, barometer 29.42 (747.3); at 8 p. m. it moderated to a steady gale, wind veering to w. and wnw.

On the 11th the storm-centre was near N. 47°, W. 44°, the barometer having risen to 29.4 (746.7), although there was no abatement in the force of the winds. The s. s. "Celtic," B. Gleadell, commanding, reported: "At noon of the 10th barometer read 30.0 (762.0); it fell steadily until 2 p. m. of the 11th, and the wind backed from n. to sw. The storm began at se. on the morning of the 11th, increasing to force 7 (Beaufort scale) at 12 m., and suddenly decreasing to force 1 at 1 p. m. and increasing to 7 again at 2 p. m. During the lull confused,

cross-seas were encountered, and the wind suddenly backed to n., blowing with greater fury than before; from 12 m. till 2 p. m. the barometer reached its lowest point, 29.47 (748.5), in N. 48° 15′, W. 43° 10′; from this time the barometer rose and the wind gradually moderated, the storm having continued twenty-four hours."

During the 12th, 13th, and 14th the storm-centre continued to move slowly northeastward, with pressure varying from 29.3 (744.2) to 29.4 (746.7), and causing moderate to strong gales from sw. to w. over the ocean between N. 45° and 50°, and W. 30° and 40°, while moderate to strong breezes from e. and ne. prevailed to the northward of the fiftieth parallel. On the 15th the disturbance appeared to be losing energy; the barometer had risen to 29.65 (753.1), and the winds had decreased in force; by the 16th the disturbance had disappeared from the chart.

4.—This depression apparently formed near the southeastern edge of the Banks on the 17th, the barometer falling to 29.2 (741.7) over the region between N. 40° and 45° and W. 45° and 55°. On the 17th the s. s. "Brooklyn City," W. Fitt, commanding, in N. 45° 28′, W. 48° 22′, at noon, had barometer 29.49 (749.0), wind s. by e., force 6, threatening weather; 3 p. m., barometer 29.44 (747.8), wind ssw., force 5; 8 p. m., barometer 29.34 (745.2); 11 p. m., barometer 29.24 (742.7), wind nw., force 6, increasing to force 9. The s. s. "City of Chicago," F. Watkins, commanding, reported, at 10 a. m. of the 17th, variable winds, hauling to n. at noon, and increasing to fresh gale at 2 p. m.; at 3 p. m. the wind was ne., moderating to fresh breeze at 8 p. m., and then shifting to nw. The lowest barometer was 29.53 (750.0), at noon, in N. 46° 41′, W. 49° 27′. The s. s. "Saint Bernard," G. Davey, commanding, took the gale at noon of the 17th, with winds from wsw., veering to s. at 1 p. m.; sw. at 4 p. m.; and variable between 5 and 7 p. m.; at 7 p. m. the wind was nw., shifting to n. during the night and blowing with almost hurricane force, accompanied by heavy rain and vivid lightning. The vessel sustained some damage by the heavy seas; the barometric minimum occurred at 6 p. m. on the 17th, while the wind was variable, the lowest reading being 29.26 (743.2), in N. 47° 13′, W. 47° 10′. The s. s. "Zaandam," A. Potjer, commanding, also encountered this storm in N. 45° 32′, W. 46° 20′, the lowest barometer, 29.36 (745.7), being observed at 2 p. m. on the 17th, with wind shifting from s. through w. to nnw. On the 18th the centre of disturbance was near N. 47°, W. 40°, the barometer having fallen to 29.1 (739.1); during this date strong gales occurred in all quadrants of the depression, but were most violent in the western quadrants. During the 19th and 20th the depression moved slowly northeastward, with but slight decrease in energy, the pressure ranging from 29.2 (741.7), to 29.5 (749.3). On the 21st the disturbance appears to have moved to the southeastward, with increasing pressure, and by the following day it had disappeared from the chart.

5.—This was probably a continuation of the depression traced over the North American continent as number v. On the 23d it occupied Newfoundland and the Gulf of Saint Lawrence, and by the following day it was shown near N. 48°, W. 45°, the lowest barometer reported being 29.6 (751.8). By the 25th it had passed eastward to about N. 48°, W. 32°, where the pressure ranged from 29.45 (748.0) to 29.5 (749.3). During the day this disturbance probably merged in an extensive depression which occupied the ocean between N. 40° and 50°, and W. 20° and 35°. Strong winds to moderate gales accompanied the passage of this depression.

6.—This disturbance moved from the northern part of the Gulf of Saint Lawrence during the 25th. On the 26th the region of least pressure was to the northward of the fiftieth parallel and west of the fortieth meridian; on the following day the lowest barometric readings were shown near W. 30°, where this depression apparently filled in. During the passage of the disturbance the barometer ranged from 29.4 (746.7) to 29.7 (754.4), and strong sw. and w. breezes were experienced by vessels near the fiftieth parallel.

7.—This was a continuation of the tropical hurricane which moved over the Carolinas on the 24th and 25th. It appears to have originated between the Bahamas and the southern coast of Florida on the 23d, but owing to the absence of reports from the above region the exact date of its formation and the location of the centre cannot at present be determined. The following data, however, clearly indicate its presence on the 23d:

The Rev. Benito Viñes, S. J., director of the Belen College Observatory, at Havana, writing to the "Maritime Journal" of Havana, on the 24th, states: "* * * During the 21st and 22d and on the morning of the 23d we were under the influence of a strong anti-cyclone, which apparently passed rapidly to the northwest. Since yesterday afternoon (23d) occasional indications of a cyclone, at a considerable distance to the eastward, have been observed. * * *"

On the 23d the schooner "E. B. Conwell" encountered a hurricane off the Florida Reefs. Captain Foster reported that the hurricane began from ne. on the 23d, the wind going around the compass and ending in a southwest gale, which lasted five hours. During this time the vessel lay on her side, and the masts were cut away to right her.

The s. s. "City of Pueblo," J. Deaken, commanding, left Havana on the 22d and encountered the hurricane on the night of the 23d, in about N. 25°, W. 80°. The gale began at nnw. and nw. at about 8 p. m., increasing in force until, at midnight, it was blowing with hurricane force and the barometer had fallen to 29.6 (751.8); at 2 a. m. of the 24th it had fallen to 29.28 (743.7) and the wind had shifted through west to southwest, continuing to blow with hurricane force, and accompanied by violent rain squalls; at 2 a. m. the ship was hove-to, and at 4 p. m on the 24th, the barometer having risen to 29.8 (756.9), she was put on her course, the wind being then s. and blowing a fresh gale. Captain Risk, commanding the s. s. "Alamo," reported as follows: "I passed Cape Hatteras Sunday, August 23, at 9.30 p. m., standard time, the weather looking bad, "sun-dogs" all day, sky gray and very heavy. We commenced to meet a heavy sw. swell which, towards morning, grew worse; wind south. On Monday morning wind and sea hauling southwesterly, at times sea-swell at wsw., and wind sw., blowing a good gale; during Monday night, same weather; Tuesday, no change until the evening, when the wind hauled to se. by s., blowing hard and puffy, which lasted until midnight, when the gale broke and the wind hauled back to sw. by s. The barometer fell to 29.83 (757.7) on the 24th." The s. s. "Alamo" was bound from New York to Galveston. Vessels to the eastward of the Bahamas do not appear to have noted any indications of a hurricane on the 22d and 23d.

On the 24th the hurricane entered Florida, whence it moved northward and northeastward over the South Atlantic seaboard states. A description of this hurricane, and the disastrous results of the same during its passage over the above states, will be found under "Cyclonic areas," number vi, in this REVIEW.

The following reports show the violence of the hurricane at sea:

On the 24th the schooner "Florence and Lilian" encountered the hurricane in N. 29° 52′, W. 80° 25′, and lost sails, deckload, and sustained damage to deck.

The s. s. "Louisiana," E. V. Gager, commanding, reported a hurricane on the 24th, with wind at s., veering to w. about the time of lowest barometer, which was (corrected) 28.83 (732.3), in N. 31° 30′, W. 80° 30′, at 1 a. m. on the 25th.

During the 25th, all vessels between N. 30° and 37° and between the United States coast and the seventieth meridian experienced furious gales, reaching at times hurricane force, from ssw., sw., and se., with pressure ranging from 29.03 (737.3) to 29.5 (749.3).

In the early morning of the 26th the winds south of 35° N. shifted to n. and nw., indicating that the storm-centre had passed northeastward off the coast line. At 1 a. m. on the 26th, the s. s. "Haytien Republic," D. T. Compton, commanding, reported that the wind, which at midnight of the 25th was

blowing a heavy gale from sw., struck the ship in a heavy squall from ssw. to nnw., lasting only a few minutes from any one direction; from 2 a. m. to 4 a. m. had very heavy squalls from w. with heavy rain, wind backing to sw. after each squall; from 8 to 10 a. m. heavy squalls from nw., ship's position at noon, N. 34° 42′, W. 74° 05′. The s. s. "Fortunatus," G. R. Mawer, commanding, reported that at 2 a. m. the wind moderated, and at 7 a. m. it came out from ne. and increased to a heavy gale with very heavy sea from ene., barometer at 8 a. m., 29.01 (736.8); latitude at noon, 38° 31′ N., longitude, 73° 20′ W. At 4 a. m. the s. s. "Louis Bucki," R. Mount, commanding, in N. 36° 44′, W. 74° 50′ had wind from n., remaining steady and blowing with hurricane force. Captain Mount reports "from midnight of 25th to 4 a. m. the wind hauled twice around the compass from sw. by the w. to n., and to s. by e."

The s. s. "City of Puebla" appears to have again entered the southwest quadrant of the disturbance after it had recurved and passed northeastward; that vessel, in about N. 35°, W. 75°, on the 26th, had barometer falling from 29.8 (756.9) to29.6 (751.8), with wind hauling to nnw. and blowing a gale, with heavy rain; at 10 a. m. the weather began to moderate and the barometer rose.

After reaching the ocean the rate of movement of the storm-centre appears to have increased greatly, and by midnight of the 26th the centre was between W. 60° and 65°, the barometer remaining about 29.1 (739.1), and strong gales were reported in all quadrants of the disturbance.

During the 27th the storm-centre moved rapidly northeastward, the barometer falling as low as 28.8 (731.5) during the passage of the storm-centre, while strong gales were experienced by all vessels between the meridians of 40° and 60° W., and from N. 40° to N. 50°.

On the 28th, the region of least pressure, where the barometer read 29.0 (736.6), was near N. 50°, W. 40°, and moderate to strong w. and sw. gales were now reported on the fiftieth parallel and between W. 30° and 40°.

On the 29th, the pressure had increased to 29.9 (759.4), and the disturbance had disappeared beyond the region covered by the reports.

OCEAN ICE.

On chart i are also shown the eastern and southern limits of the north Atlantic ice-region for August, 1885. These limits are determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers.

During the month the easternmost icebergs were observed between the meridians of 42° and 43° W., and the parallels of 45° and 50° N., and the extreme southern limit of the ice-region was near 43° 50′ N., 52° 0′ W. The small number of icebergs observed during August, 1885, would seem to indicate that the Atlantic is now comparatively clear of ice.

A comparison with the chart for the preceding month (July, 1885,) shows that, while the icebergs are considerably diminished in number, they are, however, somewhat farther eastward than those of July; the southern limit is about one degree north of that for last month.

The following table shows the comparison between August, 1885, and the same month of the three preceding years:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
August, 1882	46 50	46 00	August, 1882	46 50	46 00
August, 1883	43 26	51 41	August, 1883	48 00	44 00
August, 1884	43 24	48 44	August, 1884	47 50	43 50
August, 1885	43 48	52 04	August, 1885	48 03	42 45

Icebergs were reported during the month as follows:

1st.—S. S. "Ontario," in N. 52° 8′, W. 50° 47′, passed four large icebergs.

2d.—S. S. "Ontario" passed several large icebergs to the westward of Belle Isle; s. s. "Schiedam," in N. 48° 12′, W. 44° 35′, passed a large iceberg.

3d.—S. S. "Australia," in N. 48° 00′, W. 46° 47′, passed an iceberg about one hundred and fifty feet high, with several small pieces near it; also passed another berg about fifteen miles to the southward.

4th.—S. S. "Norseman," in N. 48° 10′, W. 48° 20′, passed a very large iceberg; temperature of the air, 49°; water, 48°.

5th.—S. S. "Austrian," in N. 47° 23′, W. 43° 14′, passed a large iceberg; s. s. "Pavonia," in N. 43° 49′, W. 51° 37′, passed a large iceberg; in N. 43° 48′, W. 52° 04′, passed a medium-sized iceberg; also, in N. 43° 57′, W. 52° 12′, passed another.

6th.—S. S. "Wyoming," at 3.30 p. m., in N. 48° 3′, W. 42° 45′, passed a large iceberg; s. s. "St. Stephen," in N. 47° 54′, W. 42° 45′, passed an iceberg about two hundred and fifty feet high; temperature of water, 48°; bark "Natant," in N. 44° 55′, W. 43° 10′, passed a large iceberg.

9th.—S. S. "Neckar," in N. 48° 48′, W. 43° 30′, passed a medium-sized iceberg; temperature, 57°.

10th.—S. S. "Elysia," in N. 44° 08′, W. 52° 30′, passed an iceberg.

23d.—S. S. "St. Laurent," in N. 48° 06′, W. 47° 40′, passed an iceberg; temperature of air, 57°.2; water, 50°.0.

24th.—S. S. "Lydian Monarch," in N. 48° 55′, W. 47° 18′, passed a large iceberg.

29th.—Brig "Bessie May," in N. 47° 10′, W. 47° 20′, passed six icebergs, the largest being about one-quarter of a mile long and about one hundred feet high.

31st.—S. S. "Edam," in N. 46° 50′, W. 47° 40′, passed three large icebergs and several pieces; s. s. "City of Berlin," in N. 46° 55′, W. 47° 04′, passed three icebergs and several small pieces.

The following are taken from the daily ice reports of the "International Nautical Magazine."

August 2d.—Ship "W. H. Smith," in N. 48° 17′, W. 49° 09′, passed five large icebergs; water, 48°; air, 52°

3d.—Ship "W. H. Smith," in N. 47° 50′, W. 50° 00′, passed a large iceberg.

8th.—Brig "Aquatic," in N. 48° 40′, W. 43° 25′, passed a large iceberg.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during August, 1885, six reports concerning storms and icebergs encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for August, 1885, is exhibited on chart ii by the dotted isothermal lines; and in the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

On chart iv the departures from the normal temperature are exhibited by lines connecting stations of equal departure. It will be seen from this chart that over the greater part of the country the month was colder than the average August. The departures below the normal temperature were most marked over the northern districts from Montana and Wyoming eastward to New England, where they varied from 4° to 7°. Along the middle and south Atlantic coasts, in the Gulf States, Rio Grande Valley, southern slope, middle plateau, north and middle Pacific coast regions the mean temperatures correspond very nearly with the normal, there being slight departures both above and below in these districts. In the southern plateau and south Pacific coast region, the mean temperatures are from 1° to 3° above the normal.